e-GRO Alert

Paul Thomas
pathomas@uga.edu

Jean Williams-Woodward
jwoodwar@uga.edu

Volume 7, Number 14 February, 2018

Rhizoctonia Infection in High Density Fern Production

In the southern U.S. the last few weeks have been chilly with long periods of cloudy skies. This isn't particularly unusual for this time of year on average, but over the last few years our winters have been sunnier, and a bit warmer. With the colder weather, growers open doors and vents less, and maintain the greenhouses at very even temperatures given the "more closed" orientation. Concurrently, many growers have been building inventories of traditional Boston ferns in hanging baskets. The baskets sell reliably, and the margins are not bad. What most growers are doing to maintain profitability of this product line is to intensify the population of hanging baskets per linear foot in order to grow more baskets in the same space as last year. When the weather is sunny the VPD is high and the time it takes for the fern foliage to dry off is measured in hours. Under these conditions all is well. When it's rainy, leaves stay wet longer, potentially allowing pathogens to take hold. What we are seeing here in the south is an outbreak of foliar *Rhizoctonia* in dense populations of baskets. This risk can be reduced substantially by understanding the production conditions that allowed the initial population of *Rhizoctonia* to take hold. For *Rhizoctonia*, this is greenhouse air temperatures between 70 and 90 degrees Fahrenheit, and humidity levels of 65% or higher, which are also "perfect conditions" for fern production.

The fungal pathogen, *Rhizoctonia solani*, causes damping-off, root rot, crown rot, and web blight on numerous herbaceous and woody ornamental plants. The fungus has an extremely wide host range, and can affect plants from plug production to landscape use. The disease appears on fern foliage as a dark grey webbing that spreads rapidly between fern pinnae. Most often it starts in the dense crown and radiates along

2018 Sponsors
American Floral Endowment
Funding Generations of Progress Through Research and Scholarships
P.L. LIGHT SYSTEMS
THE LIGHTING KNOWLEDGE COMPANY
fine
GRIFFIN
GREENHOUSE SUPPLIES INC.
FARM CREDIT EAST
THE Fred C. Gloeckner FOUNDATION, INC.
eGRO Electronic Grower Resources Online

middle aged or older fronds. *Rhizoctonia* infection is favored by moist, humid, and warmer conditions. It is present year-round inside greenhouses; however, it is most common in outdoor plantings or production during the summer months. Dense canopy coverage increases disease incidence because the dense canopy creates a good environment for the hyphae to grow and spread along the soil surface beneath the leaves. Always check the interior of and under the canopy for signs of *Rhizoctonia* hyphae. Hanging baskets in particular need to be checked routinely as the disease can spread quickly.

Critical to the Fern hanging basket issue is that *Rhizoctonia* survives in fallen leaf debris; within infected roots and rooting medium debris on benches, floors, tools, and used containers; and as hardened survival structures called sclerotia. Sclerotia are hyphae that is tightly wrapped around itself to form a small, hardened mass. Sclerotia allow *Rhizoctonia* to survive for years within an area. *Rhizoctonia* does not produce any spores. Hyphae or sclerotia can be splashed into the plant canopy or can be introduced on any soil-contaminated tools, containers, stakes, pot labels, irrigation emitters, or worker's hands.

Once fern leaves start falling onto other crops, such as newly transplanted bedding plants, or vegetative cuttings, the disease spreads rapidly. Staring with seed trays, damping-off can occur pre- and post-emergence. Pre-emergent damping off results when *Rhizoctonia* infects the germinating radical preventing the plant from ever growing. Post-emergent damping off occurs when the lower stems of the seedling is infected causing death and collapse of the plant. This can

A Boston fern with a well-established infestation of *Rhizoctonia*. Notice how the disease spread along the frond outward towards the tip.

Pronounced webbing can be seen in this image. This is the hyphae of *Rhizoctonia* that easily traverses small spaces between pinnae.

Note the necrotic zones on infected pinnae near the main vein as the infection takes over the entire frond.

often occur in plug trays, especially when the seedling foliage canopy closes creating a warm, moist pocket beneath the leaves. Plant death due to damping-off spreads in a radial pattern as *Rhizoctonia* grows outward from the initial infection point.

Across most greenhouse crops, roots infected with *Rhizoctonia* are darkly discolored and shriveled. Infected plants wilt, yellow and die. As mentioned previously, *Rhizoctonia* does not produce any spores. Growth and spread is by hyphae (thread-like material) that can look like brown, spiderweb-like webbing along the soil surface and grow upward into the foliage causing leaf blighting and an aerial web blight. Infected leaves become spotted and necrotic. Infected, dying leaves often drop from the plant, but are matted together and held to stems by fungal hyphae. If infected plants are jiggled slightly, the infected leaves may "dangle" from the stems because the hyphae is holding it in place. The thread-like hyphae is often seen between infected tissues. *Rhizoctonia* hyphae grows quickly and may spread from between closely spaced plants when the canopies touch.

Management

When greenhouse Extension folks come across these situation, we immediately talk about the disease triangle. In order for a pathogen to take hold on your crop, your plants have to be susceptible as a host, the pathogen need to be present, and the ENVIRONMENT needs to be conducive to the growth of the pathogen! Financial reality may demand more intense cropping of greenhouse crops such as ferns. In order to reduce the likelihood of the disease, growers need to pay attention to 1). Increase air flow – as the ferns grow, and fronds start meshing and intertwining, air flow can be restricted. Running HAF fans 24/7 is often recommended. Fern growers will wince as fans blowing on nearby ferns can damage fronds. The way to deal with this is to water early in the morning, and while the ferns are wet, run the HAF fans and vent the greenhouse thoroughly until leaves have dried off. 2). Pre-plan a preventative fungicide spray program for the ferns. If your economics dictate intense populations, a regular spray program can significantly slow disease spread and should be considered necessary. 3). Scout intensely. Ferns happily sitting above a grower's head tend to be ignored until a fern frond dangling down turns brown. There's no way around it, you must take a few baskets down each time you scout to look at the entire plant, especially in the crowded center of the basket. You can be smart about this and take baskets from areas that are particularly dense, or areas where there seems to be larger numbers of fern pinnae on the ground.

Management of *Rhizoctonia* also begins by following (maintaining) good sanitation practices. *Rhizoctonia* can survive and spread in and on anything containing contaminated soil. *Rhizoctonia* is known to survive and spread in dust and soil debris swept from floors. Never add the sweepings from floors or benches back into fresh or steam-sterilized rooting medium. This will only contaminate the medium. Benches and floors should

American Floral Endowment
Funding Generations of Progress Through Research and Scholarships
P.L. LIGHT SYSTEMS
THE LIGHTING KNOWLEDGE COMPANY
eGRO Electronic Grower Resources Online
Project Sponsors

be cleaned of debris and disinfested between crops. Plug trays and containers need to be cleaned of soil debris and disinfested before considering re-use.

Evaluating Costs

When not controlled early, economic losses to *Rhizoctonia* can be large. If you evaluate the costs involved with losses to *Rhizoctonia*, you may want to simultaneously consider cost-benefits to increasing plant spacing to reduce plant-to-plant contact and adding a thought-out fungicide program to reduce disease spread.

Carefully timed applications are needed to reduce Rhizoctonia growth and disease development. Fungicides containing fludioxonil, flutolanil, azoxystrobin, pyraclostrobin, fluoxastrobin, metaconzole, myclobutanil, triflumizole, trifloxystrobin, polyoxin D zinc salt, iprodione, and thiophanate methyl can reduce *Rhizoctonia* infection and spread.

Concurrent with poor environment can be high fertility levels that stress fern foliage. Do not “push” fern production with high ammonium-based fertilizers. Ferns are more responsive to temperature and moderate light levels. Salt stress can be an open door to *Rhizoctonia* establishment.

Preventative fungicide applications are more effective than curative applications. Read all product labels carefully as some products cannot be used on certain plant species. Follow all label direction for rate and frequency of application. On the next page are some suggestions for Fern *Rhizoctonia* control. Please verify your program with a trained plant pathologist or Cooperative Extension Plant Pathology Specialist:

Intense fern production must have lanes that allow air flow and sunlight to reach each basket. Adding more would be inviting infection.

Inoculum dropping from infected baskets once in contact with seedlings will spread in the traditional round, expanding circle. Sanitation prior to this level of infection is crucial.

Reducing fertility can improve growth and reduce salt stressed foliage being infected by the pathogen. Note the new growth after cutting back on fertility.

FRAC #	Trade Name	Active Ingredient	Efficacy Rating	Notes/Restrictions
1	3336, OHP 6672, Allban, Fungo Flo, Transom, T-Bird, T-Methyl	Thiophanate methyl	Fair – Good* (*Depends upon rate and disease severity)	Do not apply to Spathiphyllum or New Guinea impatiens.
2	Chipco 26019, Iprodione, Raven	Iprodione	Good – Excellent* (*Depends upon rate and disease severity)	Do not use on Spathiphyllum or as a soil drench on Impatiens, New Guinea impatiens or Pothos.
3	Tourney	Metconazole	Good	
3	Eagle 20EW	Myclobutanil	Good	
3	Terraguard	Triflumizole	Good	
7	Prostar	Flutolanil	Excellent	
7 + 11	Mural	Benzovindiflupyr + Azoxystrobin	Excellent	**Do not apply to leatherleaf fern and other ferns for cut foliage.**
7 + 11	Orkestra Intrinsic	Fluxapyroxad + Pyraclostrobin	Excellent	May cause flower discoloration on Impatiens and Petunia. Drenching may stunt Carnation, Dianthus, Impatiens, Viola, Pansy.
7 + 11	Pageant Intrinsic	Boscalid + Pyraclostrobin	Excellent	Impatiens and Petunia flowers may become discolored after application.
11	Compass 50 WG	Trifloxystrobin	Good	Do use as a drench on Pansy. **Do not use on leatherleaf fern.**
11	Disarm O, Disarm 480 SC, Fame SC	Fluoxastrobin	Good	
11	Empress Intrinsic	Pyraclostrobin	Excellent	Do not mix with organosilicone adjuvants; Do not apply on Ninebark or Wintercreeper
11	Heritage	Azoxystrobin	Excellent	Do not mix with organosilicone adjuvants. **Do not use on leatherleaf ferns.**
9 + 12	Palladium	Cyprodinil + Fludioxonil	Excellent	Do not apply to leather leaf. Use as a spray for web blight. May leave residue on poinsettia bracts.
12	Medallion WDG Spirato GHN (formerly Emblem)	Fludioxonil	Excellent	**Do not apply on leather leaf fern.** May cause stunting or chlorosis on impatiens, New Guinea impatiens, and some geranium cultivars.
19	Affirm	Polyoxin D zinc salt	Good	

e-GRO Alert

www.e-gro.org

CONTRIBUTORS

Dr. Nora Catlin
Floriculture Specialist
Cornell Cooperative Extension
Suffolk County
nora.catlin@cornell.edu

Dr. Chris Currey
Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

Dr. Ryan Dickson
Extension Specialist for Greenhouse Management & Technologies
University of New Hampshire
ryan.dickson@unh.edu

Thomas Ford
Commercial Horticulture Educator
Penn State Extension
tgf2@psu.edu

Dan Gilrein
Entomology Specialist
Cornell Cooperative Extension
Suffolk County
dog1@cornell.edu

Dr. Joyce Latimer
Floriculture Extension & Research
Virginia Tech
jlatime@vt.edu

Heidi Lindberg
Floriculture Extension Educator
Michigan State University
wolleage@anr.msu.edu

Dr. Roberto Lopez
Floriculture Extension & Research
Michigan State University
rglopez@msu.edu

Dr. Neil Mattson
Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

Dr. W. Garrett Owen
Floriculture Outreach Specialist
Michigan State University
wgowen@msu.edu

Dr. Rosa E. Raudales
Greenhouse Extension Specialist
University of Connecticut
rosa.raudales@uconn.edu

Dr. Beth Scheckelhoff
Extension Educator - Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

Lee Stivers
Extension Educator - Horticulture
Penn State Extension
Washington County
ljs32@psu.edu

Dr. Paul Thomas
Floriculture Extension & Research
University of Georgia
pathomas@uga.edu

Dr. Ariana Torres-Bravo
Horticulture/ Ag. Economics
Purdue University
torres2@purdue.edu

Dr. Brian Whipker
Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

Copyright ©2018

Where trade names, proprietary products, or specific equipment are listed, no discrimination is intended and no endorsement, guarantee or warranty is implied by the authors, universities or associations.

Cooperating Universities

Cornell University
Cornell Cooperative Extension Suffolk County
University of New Hampshire Cooperative Extension
PennState Cooperative Extension College of Agricultural Sciences
Virginia Tech
Michigan State University
UConn
Purdue University
The University of Georgia
The Ohio State University
NC State University
Iowa State University

In cooperation with our local and state greenhouse organizations

Maumee Valley Growers — Choose the Very Best.
Metro Detroit Flower Growers Association
NC Flower Power
Western Michigan Greenhouse Association
Connecticut Greenhouse Growers Association
Indiana Flower Growers Association
lifga
New Hampshire Plant Growers — Quality Garden Centers & Growers
Virginia Flower Growers Association — Since 1954
Michigan Greenhouse Growers Council